FACTORS INFLUENCING INFANT FEEDING METHOD IN AN URBAN COMMUNITY

Vivienne A. Rose, MD; Verlyn O.F. Warrington, MD; Roland Linder, MD; and Connie S. Williams, BA

Baltimore, Maryland and Lubeck, Germany

The benefits of breastfeeding are well established. However, despite this fact, rates of breastfeeding continue to be low, falling far below the goals of Healthy People 2010. Rates are even lower among ethnic minority and low-income women. In this study, we attempt to identify the factors that most influence a mother's choice of infant feeding method in an urban predominately African-American population. Phone interviews of 70 women who delivered full-term infants at an urban tertiary care hospital were conducted in order to explore knowledge, attitudes, and beliefs about breastfeeding of the mothers and that of members of their social support network.

Ten mothers (14%) exclusively breastfed. Older, caucasian, and married women were more likely to breastfeed. Breastfeeding mothers reported more partner support as well as more family knowledge about breastfeeding and had more positive attitudes about breastfeeding. Healthcare providers were not directly influential in mother's feeding choice.

From this study, we conclude that in this population, the mother's partner and family are most influential in the choice of infant feeding method and, thus, should be included in breastfeeding promotion programs. (*J Natl Med Assoc.* 2004;96:325–331.)

Key words: breastfeeding ♦ minority ♦ urban ♦ African Americans

INTRODUCTION

The nutritional, immunological, and other health benefits which breastfeeding confers upon an infant are extensively documented.[1-5] Moreover, the benefits of breastfeeding are not unique to the infant. Mothers of breastfed infants benefit from a quicker return to the prepregnancy[6] and decreased work absenteeism in order to care for ill children.[7] Compared to formula-feeding, breastfeeding represents a significant economic savings for individual families as well as for community-wide programs, such as WIC.[8-9]

Despite the well-documented benefits of breastfeeding, current national estimates fall short of the goals of the Healthy People 2010 that 75% of mothers would initiate breastfeeding, with 50% continuing to do so at six months.[10] Current data for the United States indicate that only 64% of mothers initiate breastfeeding, with only 30% and 16% breastfeeding at six months and 12 months, respectively.[11] Rates are especially low among ethnic-minority and low-income women, despite recent gains noted among this segment of the population.[12-13] Breastfeeding initiation rates for African-American and WIC participants have been reported as 37% and 40%, respectively, suggesting lower rates than for the general population.[14] Children born to these women are at greatest risk for infant mortality and morbidity. Further, it has been suggested that the difference in breastfeeding behavior

 From the Department of Family Medicine, University of Maryland, Baltimore, Baltimore, MD (Rose, Warrington, Williams) and the Department of Medical Informatics, Medical University of Lubeck, Lubeck Germany (Linder). Send correspondence and reprint requests for *J Natl Med Assoc.* 2004;96:325–331 to: Vivienne A. Rose, MD, Department of Family Medicine, University of Maryland, Baltimore, 29 South Paca Street, Lower Level, Baltimore, MD 21201; phone: (410) 328-2550; fax: (410) 328-8726; e-mail: vrose@som.umaryland.edu

is an important contributor to the racial difference in infant mortality rates.[15] Therefore, it would be expected that children born to minority, low-income women would realize the greatest benefits of breastfeeding.

In the United States, the profile of the typical breastfeeding mother is that of an older, married, well-educated caucasian woman.[16] It is believed that the mother's choice of infant feeding method is influenced by complex psychosocial factors, including the maternal belief system,[17] the social support network,[18-19] and the rise of the formula industry.[20] However, significant knowledge deficits exist as to what factors most influence a mother's choice of infant feeding method, especially in non-caucasian populations. This cross-sectional study was undertaken to identify those factors that most influence a mother's choice of infant feeding method in a predominantly African-American, urban community.

METHODS

The study population consisted of mothers who delivered live full-term infants at the University of Maryland Hospital (UMH) between June 1 and December 31, 1996. UMH, a tertiary care facility located in downtown Baltimore, is surrounded by several predominantly African-American, economically disadvantaged communities. According to current census data, 64% of the population of Baltimore city is black or African-American, and 23% live below the poverty line, with the annual per capita income (1999) of less than $17,000. [21]

Table 1. Sociodemographic Profile and Feeding Method of Sample

Race	
African American	70% (49/70)
Caucasian	24% (17/70)
Other	6% (04/70)
Age	
Mean	26 years
Range	17–39 years
Marital Status	
Married	36% (25/70)
Single	64% (45/70)
Infant Feeding Method	
Exclusive breastfeeding mothers	14% (10/70)
Exclusive bottle-feeding mothers	60% (42/70)
Combination bottle- and breastfeeding	26% (18/70)
Education	
Some high school	29% (20/70)
Graduated high school	31% (22/70)
Some college	31% (22/70)
Received college/ professional degree	7% (05/70)

Obstetric care at UMH is provided by obstetricians, family physicians and nurse-midwives. Mothers who gave birth to premature infants, or had medical or congenital conditions that would preclude breastfeeding, were excluded from the study. Mothers with known medical contraindications to breastfeeding (e.g., HIV disease, as well as women who lived outside the UMH catchment area but who were transported to UHM for prenatal care) were also excluded.

Prospective subjects were identified from the labor and delivery database at UMH and were sent postcards soliciting participation. There were 649 potentially eligible mothers who were invited to participate by postcards. Of these, 8% refused to participate in the study, 24% of the postcards were returned as undeliverable by the postal service, 16% of mothers had no phone service at the time of attempted contact, and 42% could not be contacted after three attempts were made.

The 84-item survey instrument consisted of multiple-choice questions as well as those requiring short-answer and Likert-scale-rated responses. This scale allowed for a ranking of answers from 1 to 5, with 1 representing strong disagreement, and 5 representing strong agreement. Questions were designed to elicit demographic information, as well as to explore breastfeeding knowledge and attitudes of participants and persons in their social support system. In addition, the perceived level of support for the chosen infant feeding method as well as modeling behavior of persons in the social network system were also explored. Mothers were also asked to rate the importance of those factors that contributed to their choice of infant feeding method. The mean of the response values on the Likert scale was calculated, thus allowing a numerical representation of the results (see Tables 2.0–2.3).

In this study, breastfeeding was defined as suckling an infant at least once daily for a period of at least one month. Exclusively breastfeeding mothers did not supplement with formula at any time,

while mothers designated as formula-feeders did not breastfeed at all. Combination-feeding mothers combined both methods to varying degrees.

RESULTS

Seventy mothers were successfully contacted and completed the questionnaire. Of the participants, 70% were African-American, and 24% were caucasian, while only 6% were of other ethnicity. The mean age of the participants was 26 years with a range of 17–39 years. The majority of the mothers were single (74%), and of them, 88% were African-American. This data as well as the distribution of infant feeding method is presented in Table 1.

Feeding Method

Ten mothers (14%) exclusively breastfed, 42 mothers (60%) bottle-fed exclusively, while 18 mothers (26%) combined breastfeeding and formula-feeding to varying degrees. These three groups of mothers were compared with regard to age, race marital status, prenatal course, and social support network.

The method of feeding was further examined for the two major ethnic groups. Noncaucasian, non-African-American (other) mothers were excluded from this analysis because they constituted only a small fraction (6%) of the sample population. Fifty-six percent of the exclusively breastfeeding mothers were caucasian (5/9), while 44% were African-American (4/9). Exclusively formula-feeding mothers were predominantly African-American, 85% (34/40). These differences were found to be statistically significant by the chi-squared test with a $p<0.01$. Sixty-five percent of the mothers who combined breast- and formula-feeding were African American.

Age

There was a positive correlation between age and decision to breastfeed, (Wilcox signed Rank Test; $p=0.0001$). Older mothers were more likely to breastfeed; 90% of exclusively breastfeeding mothers were at least 25 years old, whereas in the exclusively bottle-feeding group, only 38% (16/42) were older than 25 years old. Half of the women who used a combination of breast- and formula-

Table 2. Mothers' Perception of the Level of Involvement of Their Social Support Network: Involvement in Feeding Choice

Variables	Breast	Bottle	Both	P Values (Breast vs. Bottle)
Partners involved in decision	3.7	3.0	3.8	0.201
Family involved in decision	2.6	2.6	2.4	0.732
Friends involved in decision	3.0	2.3	2.1	0.618

Breast: exclusive breastfeeder; Bottle: exclusive formula-feeder; Both: combination breast and formula

Table 2.1. Mothers' Perception of the Level of Involvement of Their Social Support Network: Support of Feeding Decision

Variables	Breast	Bottle	Both	P Values (Breast vs. Bottle)
Partners supportive of feeding choice	4.7	3.9	4.2	0.047
Family supportive of feeding choice	4.4	3.9	4.2	0.054
Friends supportive of feeding choice	4.1	3.5	3.7	0.458

Breast: exclusive breastfeeder; Bottle: exclusive formula-feeder; Both: combination breast and formula

feeding were older than 25 years. When the exclusively breastfeeding mothers and the exclusively formula-feeding mothers were compared using the Wilcox Rank Test, the relationship between age and breastfeeding was found to be statistically significant (p value of <0.0001).

Marital Status

Of the total cohort, 36% of mothers were married. Among exclusive breastfeeders, 90% of the mothers were married (9/10), while 17% of women who exclusively formula fed were married (7/42). Fifty-six percent of the married mothers exclusively breastfed their babies (9/16), compared to 3% (1/37) of unwed mothers. There was a statistically significant positive correlation between being married and breastfeeding the infant (chi-square test, p<0.001).

Education

Twenty-nine percent of the women in our study had less than a 12th-grade education, 31% graduated high school, 31% had some college, while 7% graduated college and/or attended professional or graduate school. There was no statistically significant correlation between education and breastfeeding as tested by Wilcox signed rank (p 0.09). There was also no significant correlation between race and education in the study population.

Prenatal Course

Almost all (90%) of the mothers presented for prenatal care in the first trimester and had consistent prenatal care (more than nine visits); 56% (39/70) received care from obstetricians, while 30% (21/70) received care from family practitioners, and 11% from midwives (8/70). The type of provider had no statistically significant bearing on the choice of infant feeding method.

Social Support Network

The involvement of the social support network and its impact on the choice of feeding method was examined using both short-answer questions and the Likert scale for graded responses. The responses of mothers who exclusively breastfed and mothers who exclusively bottle-fed are compared in Tables 2.0–2.3. Data for mothers who both breast- and bottle-fed their infants were not included in this comparison, as the differences were not as apparent nor as amenable to statistical analysis.

Breastfeeding mothers more often reported that their partners were supportive of their choice of feeding method. They also reported that their partners were knowledgeable about breastfeeding more often than did their formula-feeding counterparts. We attempted to investigate the role of modeling by asking mothers if they had ever seen a mother breastfeed her infant. While most women reported having done so, more exclusively breastfeeding mothers (90%) than exclusively formula-feeding mothers answered affirmatively. This difference was even greater when mothers were asked if their mothers had breastfed an infant. Forty percent of breastfeeding mothers answered yes, compared to 17% of bottle-feeding mothers and 67% of combination-feeding mothers. The differences, however, were not statistically significant.

Women who breastfed either exclusively or in combination with formula-feeding were more likely to agree that their partners were involved with and supported their choice of feeding method. Among exclusively breastfeeding mothers, the

Table 2.2. Mothers' Perception of the Level of Involvement of Their Social Support Network: Knowledge About Breastfeeding

Variables	Breast	Bottle	Both	P Values (Breast vs. Bottle)
Partner's knowledge about breastfeeding	4.1	2.8	3.9	0.028
Family's knowledge about breastfeeding	4.3	3.6	4.1	0.021
Friends' knowledge about breastfeeding	3.7	2.9	3.4	0.476

Breast: exclusive breastfeeder; Bottle: exclusive formula-feeder; Both: combination breast and formula

father of the baby was present at the time of delivery 90% of the time as compared to 21% of the exclusively bottle-feeding mothers. (X^2 test, $p< 0.01$). Married women were accompanied by their husbands 96% of the time as compared to single women who were accompanied by the father of the baby 66% of the time ($p<0.01$).

We attempted to explore the support of the mother's family by asking about their involvement in the feeding decision, their knowledge, and their level of support for the mother's feeding choice. Our results reveal that exclusively breastfeeding and exclusively bottle-feeding mothers reported the same level of family involvement (2.6). However, breastfeeding mothers reported that their families were more knowledgeable than those of bottle-feeding mothers about breastfeeding ($p=0.021$).

The role and impact of the mother's friends on choice of an infant feeding method were also investigated. A consistently more positive response was obtained from breastfeeding mothers versus bottle-feeding mothers regarding the influence and involvement of friends. However, these differences were not found to be statistically significant. A similar result was obtained for the mothers' perception regarding breastfeeding experience of family members and friends (Table 2.3).

An examination of the mothers' knowledge and personal belief system regarding breastfeeding is presented in Table 3.0. Results show that mothers who breastfed responded more positively when asked if breastfeeding was enjoyable and convenient. In the latter case, the difference between the two groups was found to be statistically significant ($p=0.047$). This study also explored some of the commonly held negative attitudes/perceptions regarding breastfeeding. Mothers were asked if they thought breastfeeding was painful. The results show a statistically significant difference between the two groups ($p=0.018$); mothers who did not breastfeed held this view more strongly than did the mothers who had actually experienced breastfeeding.

Mothers were asked if they thought breastfeeding was best for their baby. Both groups agreed strongly with this statement, the results showing no significant difference between the two groups.

DISCUSSION

The findings of this study are in many ways consistent with data obtained in earlier studies. Breastfeeding rates in our population were comparable to those seen nationwide: older age, being married, and caucasian race are associated with the decision to breastfeed an infant.[22] However, in our study, we found no significant correlation between educational status and the choice of infant feeding method. This may be due, in part, to the sample size.

Breastfeeding mothers appear to accept breastfeeding as a normative social behavior as modeled by their mothers or by other women. Breastfeeding mothers had greater involvement of members of the support network—particularly the father of the baby—thus, demonstrating the significant influence the father had in the choice of infant feeding method. This is consistent with other studies.[23-24]

Both breastfeeding and formula-feeding mothers reported the same level of family involvement in their decision regarding infant feeding method. However, breastfeeders reported more family knowledge and experience with breastfeeding. This would suggest that the families with these characteristics may play an important role in influencing a mother's decision to breastfeed an infant. Mothers from these backgrounds may see breastfeeding as more normative behavior.

We found no significant difference between

Table 2.3. Mothers' Perception of the Level of Involvement of Their Social Support Network: Family's Experience With Breastfeeding

Variables	Breast	Bottle	Both	P Values (Breast vs. Bottle)
Family's experience with breastfeeding	4.0	3.4	3.9	0.179
Friends' experience with breastfeeding	3.4	2.6	3.4	0.666

Breast: exclusive breastfeeder; Bottle: exclusive formula-feeder; Both: combination breast and formula

breastfeeding mothers and formula-feeding mothers in regard to the role of their friends. This contrasts with research from rural Mississippi where, for both African-American and caucasian women, having a breastfeeding friend was as strongly predictive of breastfeeding as having a breastfeeding family member.[25]

Our results show that mothers who breastfeed had an overall better understanding of breastfeeding. This is seen in the difference in perception between the two groups, regarding the convenience and pain that may be associated with this practice. It is an important finding that the more negative ideas were held more strongly by the mothers who did not breastfeed. This may indicate that misinformation and lack of knowledge may be an important barrier to breastfeeding in this patient population.

Mothers in this study reported little or no influence of the healthcare provider on the choice of feeding method, regardless of whether the provider was an obstetrician, family physician, or a nurse–midwife. This is consistent with the findings of other researchers.[26] It is noteworthy, however, that some researchers have established an association between clinician support and the duration of breastfeeding.[27] Again, this is another area that should be explored in further work with this population.

One of the drawbacks identified in this study was the small sample size. A major contributing factor was the difficulty in contacting mothers. The mothers who were successfully contacted may represent a subgroup of women who are less transient, have a more stable domestic environment (including marriage partners) and are able to spend more time at home with their infants. This may contribute to a somewhat biased sample. Conversely, it is reasonable to expect that the women who were not contacted were more likely to be those who traditionally fit the sociodemographic profile of nonbreastfeeders. Had these women been included in the sample, it is quite likely that breastfeeding prevalence rates would have been even lower.

Another drawback is that in this study, as with many others, data regarding father involvement and support was obtained indirectly by asking mothers about their perception of these issues. This presents a potential source of error, as demonstrated in earlier studies.[28-29] Potentially more information about the father's level of involvement could have been obtained by inquiring as to the cohabiting status of the father of the infant prior to birth, at birth, and postpartum. This and other descriptors of the father can be a focus of further studies.

Differences between exclusive breastfeeding and formula-feeding mothers were more apparent and also more amenable to statistical analysis. However, combination feeders present an interesting group of mothers who warrant further investigation. The data set did not provide enough information on the exact contribution of each method to the infant's nutrition, the chronological sequence of feeding, or the reasons for cessation of breastfeeding. These issues—as well as the relationship between the above mentioned social factors, the mothers' work history before and after birth, and the duration of breastfeeding—should be explored in further studies.

CONCLUSION

The results of this study indicate that in this patient population it is: 1) the support of the moth-

Table 3. Mothers' Perception/Attitude Regarding Breastfeeding

Variables	Breast	Bottle	Both	P Values (Breast vs. Bottle)
Breast sag	2.2	2.5	2.6	0.572
Breastfeeding enjoyable	4.6	3.2	3.8	0.064
Breastfeeding convenient	4.8	3.4	4.2	0.047
Breastfeeding painful	1.7	2.9	2.8	0.018
Breastfeeding embarrassing	1.6	2.4	1.9	0.072
Breastfeeding best for baby	4.6	4.0	4.7	0.317

Breast: exclusive breastfeeder; Bottle: exclusive formula-feeder; Both: combination breast and formula

er's partner, 2) the breastfeeding knowledge of the partner and of the family that most influence the choice of infant feeding method, and 3) misconceptions and lack of knowledge on the part of mothers may be a barrier to breastfeeding. The implication of this finding is that in order to increase breastfeeding rates in urban predominantly African-American populations, it may be necessary to establish programs that educate mothers as well as their partners and family members about breastfeeding. This is consistent with the recommendations of the Blueprint for Action on Breastfeeding developed by the U.S. Department of Health and Human Services.[30] While healthcare providers do not appear to directly influence the infant feeding decision process, they may still have an important role as educators and facilitators of the integration of the important members of the social support network into this aspect of healthcare.

ACKNOWLEDGEMENTS

Many thanks to Dr. E. Pecukonis and Dr. B. Deforge, University of Maryland School of Social Work, for their help and encouragement.

REFERENCES

1. Cushing A, Samet JM, Lambert WE, et al. Breastfeeding Reduces Risk of Respiratory Illness in Infants. *Am J Epidemiol.* 1998;147:863-870.

2. Burris D, Ey John, Holberg C, et al. Exclusive Breastfeeding for at Least Four Months Protects Against Otitis Media. *Pediatrics.* 1993;91:867-872.

3. Raisler J, Alexander C, O'Campo P. Breastfeeding and infant illness: a dose-response relationship? *Am J Public Health.* 1999:89:25-30.

4. Ford RP, Taylor BJ, Mitchell EA, et al. Breastfeeding and the risk of sudden infant death syndrome. *Int J Epidemiol.* 1993; 22:885-890.

5. Mitchell EA, Taylor BJ, Ford RP, et al. Four modifiable and other major risk factors for cot death: the New Zealand study. *J Paediatr Child Health.* 1992;28 Suppl. 1:S17-20.

6. Dewey KG, Heinig MJ, Nommsen LA. Maternal weight-loss patterns during prolonged lactation. *Am J Clin Nutr.* 1993:53:162-166.

7. American Academy of Pediatrics: Work Group on Breastfeeding. Breastfeeding and the Use of Human Milk. *Pediatrics.* 1997;100:1035-1039.

8. Maryland Women, Infant, and Children Program (WIC), unpublished data, 1999.

9. Montgomery DL, Splett PL. Economic benefit of breastfeeding infants enrolled in WIC. *J Am Diet Assoc.* 1997;97:379-385.

10. U.S. Department of Health and Human Services. Developing Objectives for Healthy People 2010. Washington, DC: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion; 1997.

11. NCHS. Health, United States, 1992. Hyattsville, MD: U.S. Department of Health and Human Services, Public Health Service, CDC, 1992. DHHS Publication N(PHS) 92-1231.

12. Ross Products Division, Abbott, L Laboratories, Inc. Mother's Survey. Columbus, OH: The Company, 1999.

13. Wright AL. The Evidence of Breastfeeding: The Rise of Breastfeeding in the United States. *Pediatr Clin North Am.* 2001; 48:1-9.

14. Ryan AS. The Resurgence of Breastfeeding in the United States. *Pediatrics.* 99:E12, 1997.

15. Forste R, Weiss J, Lippincott E. The Decision to Breastfeed in the United States: Does Race Matter? *Pediatrics.* 2002;109: 1186-1187.

16. Baranowski T, Rassin DK, Richardson CJ, et al. Attitudes toward breastfeeding. *Developmental and Behavioral Pediatrics.* 1986; 7:367-372.

17. Lizarraga JL, Maehr JC, Wingard DL, et al. Psychosocial and Economic Factors Associated with Infant Feeding Intention of Adolescent Mothers. *J Adolesc Health.* 1992;13:676-681.

18. Eriksen W. Breastfeeding, smoking, and the presence of the child's father in the household. *Acta Paediatr.* 1996;85:1272-1277.

19. Ryan AS, Rush D, Krieger FW, et al. Recent Declines in Breastfeeding in the United States, 1984–1989. *Pediatrics.* 1991; 88:719-727.

20. Snell BJ, Krantz M, Keeton R, et al. Original Articles: Research, the Association of Formula Samples Given at Hospital Discharge With the Early Duration of Breastfeeding. *J Hum Lact.* 1992;8:67-72.

21. U.S. Bureau of the Census. (2000). National Vital Statistics Report. Washington, DC. U.S. Bureau of the Census.

22. Wagner CL, Wagner MT. The Breast or the Bottle? *Clin Perinatol.* 1999;26:505-525.

23. Grossman LK, Larsen-Alexander JB, Fitzsimmons SM, et al. Breastfeeding Among Low-Income High-Risk Women. *Clin Pediatr.* 1989;28:38-42.

24. Grossman LK, Fitzsimmons SM, Larsen-Alexander JB, et al. The Infant Feeding Decision in Low- and Upper-Income Women. *Clin Pediatr.* 1990;29:30-37.

25. Freed GL, Fraley JK, Schanler RJ. Accuracy of Expectant Mothers' Predictions of Fathers' Attitudes Regarding Breastfeeding.

26. Kum-Nji P, Mangrem CL, Wells PJ, et al. Breastfeeding Initiation: Predictors, Attitudes, and Practices Among Blacks and Whites in Rural Mississippi. *South Med J.* 1999; 92:1183-1188.

27. Taveras EM, Capra AM, Braveman PA, et al. Clinician Support and Psychosocial Risk Factors Associated With Breastfeeding Discontinuation. *Pediatrics.* 2003;112:108-115.

28. Littman H, Medendorp SV, Goldfarb J. The Decision to Breastfeed: the Importance of Father's Approval. *Clin Pediatr.* 1994;214-219.

29. Humphreys AS, Thompson NJ, Miner KR. Intention to Breastfeed in Low-Income Pregnant Women: The Role of Social Support and Previous Experience. *Birth.* 1998;25:169-174.

30. U.S. Department of Health and Human Services. HHS Blueprint for Action on Breastfeeding. Washington, DC: Government Printing Office; 2000. U.S. Department of Health and Human Services, Office on Women's Health publication 1-33.